blood pressure, but, on the contrary, a fall in the systolic pressure can often be noted coincident with an improvement in the general condition of the patient. Iodide has been used in conjunction with digitalis when it was deemed advisable. In anemic cases, when the general nutrition is badly affected, I have found the combination with arsenous acid very efficacious, and it may succeed when digitalis alone would fail.

CONCLUSIONS. 1. Digitalis acts as a specific on the tonicity of the heart muscle, and is indicated whenever symptoms point to a failure of that function.

2. Its tonic effects are best secured with a dose equal to the amount excreted—about 0.1 gram a day—though doses of 0.15 and 0.2 gram a day sometimes can be taken for weeks without the appearance of cumulative effects.

3. Loss of tonicity is shown first by general symptoms—rales over the bases of the lungs, enlargement of the liver, and slight œdema of the ankles.

4. Digitalis is indicated, therefore, whenever these symptoms appear, and especially in cases in which the patient, after recovering from a severe break in compensation, shows a tendency to fail on the slightest exertion.

THE TREATMENT OF TYPHOID FEVER.[1]

By Frank Sherman Meara, M.D.,
PROFESSOR OF THERAPEUTICS IN THE CORNELL UNIVERSITY MEDICAL COLLEGE, NEW YORK.

ETIOLOGY. Typhoid fever, which is one of the commonest diseases in our experience, but less common than in the experience of our medical fathers, thanks to the interest elicited by the work of the research scholar and an awakened sense of civic responsibility, is due to the invasion of the body by a definite bacterium, Bacillus typhosus of Eberth. The gross lesions are referable to the intestinal canal, but they are to be looked upon merely as local expressions of a general infection, just as lobar pneumonia is but a localization in the lung of an organism that infects the whole body. This is an important therapeutic concept, as it directs our attention to the individual as a whole and spares us useless effort to medicate the intestinal canal, in the hope of curing the disease. The mortality varies in different epidemics and varies in private and hospital practice, but on the whole is in the neighborhood of 15 per cent.

THERAPY. We are dealing with a self-limited disease, the cure of which depends on the elaboration of specific bodies by the tissue cells of the patient, a result we have not yet been able to duplicate in the laboratory. This does not mean that we cannot influence the course of the disease. On the contrary, a considerable fall in mortality has come about as the result of skilled care, conscientious watchfulness, competent nursing, and the application of definite measures to the relief of symptoms and complications.

---

[1] A lecture delivered at the Cornell University Medical College.

REST. It would seem almost superfluous in a disease of such import as typhoid fever to insist on rest, but it must be remembered that the onset is slow, and in mild cases, or what at the beginning promises to be a mild case, the patient is prone to look upon it as an indisposition, and the physician may be uncertain of his diagnosis, and in the meantime the patient is on his feet, perhaps attempting to attend to his business, or at least protesting against the bed. These cases are the so-called "walking typhoids." Statistics have shown that these cases do not do as well as those receiving attention promptly, and it is probable that what might have been a mild typhoid attack has been converted, by lowering the resistance of the patient, into a severe or fatal case.

Where, then, suspicion is aroused as to the possibility of typhoid fever, the patient should not be permitted to waste his precious strength while one is awaiting the development of diagnostic symptoms or the result of blood examinations. He should be put to bed at once and prepared for what is likely to be a long siege. Real rest can be obtained only by careful and competent nursing, by the exclusion from the sickroom of all business cares and causes for anxiety, and refusal to make the sickroom a reception room for solicitous friends.

The patient is not to leave the bed to go to the toilet, or even to use a commode, but the bed-pan is to be insisted on. This trouble comes in the early days of the fever. It will be a source of argumentation and contention, but one's dictum must be firm, backed up by a few words of explanation. The need for rest, the need of sparing the tissues useless oxidation, is emphasized by the length of the disease.

BED. While remembering to conserve the strength of the patient, it must not be forgotten that the strength of the attendant ought to be economized, and in no way can this be done to better advantage than in selecting a bed on which the patient can be readily handled. The ideal bed is the half-bed, or single bed, of a convenient height, with strong woven wire springs and a firm springy mattress. A folded blanket will render the surface smooth. Over the blanket, is to be placed a sheet, a rubber sheet, and a draw sheet. Sheets should be drawn smooth, for freedom from wrinkles and dryness and cleanliness are great factors in preventing discomfort, and, in very sick patients, the formation of bedsores. Over the patient a sheet and a light blanket is sufficient; and one low pillow, not too soft, makes for comfort. The upper sheet should not be drawn too tightly over the feet of the patient, as is often done to improve the appearance of the bed, to the patient's great discomfort.

ROOM. The best room is the largest room, with the amount of light most gratifying to the patient; with sunshine in the colder months, and shade in the summer months. It should be well ventilated and free from encumbrances. A hardwood floor is best. If there are carpets, they should be protected in the vicinity of the bed, in consideration of contamination with secretions, which may occur in the ordinary handling of the patient. It is very desirable to have a bathroom near at hand, for the convenience of disinfecting and disposing of secretions, as well as for facilitating hydrotherapeutic measures.

If there is a balcony or piazza that may be approached from the room, it meets a great desideratum, for in summer the patient ought to be kept out of doors, and in winter I am convinced of the value of cold air in improving the nervous manifestations and general condition of the patients. I believe we shall use the open-air treatment for all infectious fevers with vast benefit.

The bed should be prepared by placing a blanket on the wire springs, and on this a rubber sheet, each extending well below and on either side of the bed. On these is placed the mattress, on which the bed is made as usual. Over the mattress and its coverings the blanket and rubber sheet are now folded like an envelope, thus preventing the entrance of air under the clothes. A hood is worn by the patient and a hot-water bottle placed at the feet; the nurses are dressed for out of doors.

When there is diarrhea and incontinence of the bowel or bladder, then more constant attention to the bed does not make the open-air treatment feasible. If the patient is very sick or is delirious, a nurse should be in the room day and night, as self-destruction has occurred in this condition.

CARE OF THE BODY. If a properly trained nurse is in attendance, she will exercise all those niceties of her profession with reference to the care of the patient's body and comfort, which will usually improve on one's own suggestions, but it is unjust to the patient to take that for granted, and a quiet survey of the situation and inquiry into the methods used is proper. However, all nurses are not properly trained, and all patients cannot afford the attendance of a nurse. Under these circumstances, one must know what should be done; one should write out explicitly what is to be done, and then see that the instructions are comprehended and successfully carried out.

The state of the patient's mouth requires constant attention, lest, from a foul condition, it become the source of infection of the mucous membranes and their lymphatic supply, the tonsils, the ears, and the lungs; and, upsetting the stomach, destroys the appetite. The teeth should be brushed two or three times a day. The mouth should be rinsed with water or boric acid solution (2 per cent. to 4 per cent.), or one of many mild alkaline and antiseptic washes, after each feeding.

If there is a heavy coat on the tongue, such may be removed by careful scraping with the edge of a whalebone. Especial care must be taken to get at the back of the tongue and remove thick mucus from the throat. The cotton swab on a toothpick is a ready means of getting at the dead spaces in the mouth, where food may collect and decompose.

If there is much sordes, and there are fissures, a mild antiseptic containing phenol is of value. Here is one recommended for the purpose:

℞—Phenol solution, 1 to 20,
Glycerin . . . . āā 1 ounce
Boric acid, saturated solution . . . . 8 ounces—M.
S.—To be used as a mouth wash.

Bits of cracked ice are grateful, and the conditin is much relieved if the patient gets enough water to drink. The nose is to be kept clear by the use of olive oil on a swab, to soften dried masses, and cleansing with boric acid solution or mild alkalines. Whether hydrotherapeutic measures are pursued or not, the body is to have a cleansing bath with warm water and soap and the sponge.

The formation of bedsores is the *bête noire* of a good nurse, and this she avoids by constant care of the skin. Moisture about the buttocks is quickly removed, the parts sponged with alcohol or alcohol and water, equal parts, and, if the buttocks have been much soiled, with a mild antiseptic solution—phenol, 1 to 40, for example. If pressure has been long continued, the skin is rubbed to improve the circulation in the part. The parts are then dusted abundantly with a drying powder, like any of the talcum powders used for toilet purposes. The skin of the whole back is treated in this way. Especial attention is paid to the sacrum, the anus, the buttocks, and the heels. The position of the patient should be frequently changed, not only to avoid bedsores, but to lessen the chance of hypostasis in the lungs.

If sores are threatening, rings are used to take the pressure off, but unless used intelligently, they may be more annoying than useful. If bedsores develop, it may be imperative to use a water-bed or air-bed. The excoriated skin may be covered with a drying powder, like aristol, or a bland ointment, like zinc oxide ointment. If more serious sores appear, they are to be treated on surgical principles.

At certain times and in certain places flies are a great annoyance to the patient, and, not only that, but a very real danger to other members of the family or vicinity, by their well-known ability to carry infection from the patient to the food or drink of those about him. Under such circumstances, screens in the room and over the patient are all-important.

This leads naturally to a consideration of the disposition of the secretions and disinfection of the patient's clothes and utensils.

DISINFECTION. The stools, the urine, the clothes, the utensils, the bath water, the sputum, and the vomitus have all to be taken into consideration. Stools may be disinfected by 1 to 20 phenol. At least twice the volume of the stool should be used, the stool well broken up and allowed to stand several hours. Chlorinated lime, too, is used. It must be fresh, as it soon deteriorates on exposure to the air. A 1 per cent. solution is required; or, to avoid making exact solutions, a handful is put in the pan with the stool and enough water to cover and mix it with. Bichloride is not reliable for disinfecting stools. Urine is disinfected with 1 to 20 phenol, using one-third to equal amounts. The lesser amount has been shown to be effectual after one and one-half hours' contact. 1 to 1000 bichloride, in volumes equal to $\frac{1}{15}$ to $\frac{1}{40}$ of the urine, standing for an hour and a half, is effectual.

Bath water may be disinfected by adding ½ pound of chlorinated lime to a tub (200 liters) of water and allowing it to stand an hour.

Bed linen should be soaked in 1 to 20 phenol for two hours or in formalin, 3 ounces to a gallon, for twelve hours, and then thoroughly boiled. Bed-pans, urinals, rectal tubes, and rubber sheets can be disinfected in phenol 1 to 20 and allowed to soak in it.

Knives, forks, spoons, and crockery can be thoroughly boiled. Sputum is best burned; vomitus may be treated with phenol and lime.

Mattresses can be disinfected after the disease is over with dry heat, and the room should be disinfected.

The nurses should give tub-baths, wearing rubber gloves and a rubber apron. If given with the bare hands, and, indeed, after handling secretions, the hands should be carefully washed and soaked in 1 to 1000 bichloride.

It must be remembered that the administration of urotropin by the mouth disinfects the urine, but we should not intermit the precautions just named.

DIET. Everyone who has treated typhoid fever has felt that the most urgent problem he has to meet is the dietary. He has consulted authority with the result that he has come away more bewildered than instructed. He has been urged to maintain a low diet, lest too great a burden be thrust on digestive organs and tissues weakened by disease, or damage be done to the inflamed intestinal wall with the production of hemorrhage or perforation; on the other hand, he has been taught to give the patient great freedom in diet, lest strength be sacrificed as the result of starvation. He has read arguments for liquid food, for solid food, for stimulating food, for bland food, until in his despair he chooses some guide with whom he is more or less well acquainted, copies his directions with slavish exactness, and proceeds to feed all patients by this measure.

We are dealing here with a fever and a long fever, during which oxidative changes must be met, either at the expense of food ingested or of the body itself, and during which extensive tissue destruction is going on as the result of the disease; this must be made good by the food or the deficit will increase continuously up to convalescence, or bring about a bankruptcy, before convalescence can be attained.

The first great fact to be kept in mind in all fevers is that the body demands as much energy and heat in terms of heat units in fever as it does in ordinary rest in health; we will say 33 calories per kilo, or some 2300 calories for a man of 70 kilos, or 154 pounds; and that as a result of the fever itself, he usually needs some 25 per cent. more, or about 40 calories per kilo, or some 2800 calories for a 154-pound man. Therefore, he ought to get 2800 calories to meet this need from his food, unless he takes it out of his own body.

The second great fact with reference to the body needs to be met by the food, is that there must be a certain minimum of protein in the diet. Voit's standard was something over 100 grams per day, but more recent work has shown that even less would do, but that some 70 grams should be afforded. This demands intelligent scrutiny of the food, with the knowledge of its composition, in order that this minimum should be observed; or, what is next in importance, that it should not be too much overstepped.

The third great body of facts, in dealing with diet in fever, are those which inform us of the loss of protein to the body in fever and how to shelter it by the food administered. The wasting after fever, even a short fever, and so emphasized after a long one, is one of the most familiar phenomena of disease. The wastage is, of course, due to loss of both fat and protein, but more especially, from the standpoint of importance, of protein.

The destruction in fever may be assigned to three particular causes: (1) Starvation. There can be no doubt that our patients are, in too many instances, underfed. That this cause for protein loss can in a goodly measure be prevented goes without saying. (2) Fever itself. Pyrexia exerts a destructive action on protein of the tissues, as can be determined by studying the nitrogenous output in fever induced artificially, as in hot baths or by puncture of the floor of the fourth ventricle. In disease, however, it is not always easy to separate it from: (3) toxic destruction, meaning the breakdown induced by the toxins of the infecting organisms, in part autolytic, perchance, but the detail of which is still obscure.

The influences of pyrexia can, to a certain degree, of course, be influenced by hydrotherapeutic and other antipyretic measures. The effect of the toxins, until we have specific sera or other specific measures at our command, however, are not under our control; and yet, it is the purpose of this thesis to show how near to a nitrogenous equilibrium a patient can be brought, in the face of this toxemia, if supplied with the proper food in the proper manner.

I am indebted to Dr. Shaffer and Dr. Coleman[1] for many statements of facts made here, but they are not to be made responsible for any conclusions I may draw.

---

[1] Archives of Internal Medicine, vol. iv; Jour. Amer. Med. Assoc., 1908, li.

In the disease in question wasting is marked. A loss of 10 pounds is slight, but losses of 40, 50, 60 pounds or more may occur. In this loss, nitrogenous tissue takes a large share. Cases in which the nitrogen loss has been studied, show the equivalent of 7 pounds of pure muscle tissue in twelve days, of 5½ pounds of muscle tissue in eight days, and not rarely 1½ pounds of muscle tissue in a day. This loss may mean not only a deprivation to the body of the functions this tissue subserve, but also disturbances, perhaps toxic in character, induced by the effort to katabolize this protein. The nitrogen partition offers similarities to those seen in the toxemias of pregnancy, and, to quote Dr. Shaffer's words, "there are severe so-called toxic cases of typhoid fever which terminate with acute yellow atrophy of the liver, a condition which appears to be closely associated with a particular type of faulty protein metabolism."

This loss can be avoided, to a greater or less degree, by the food. In considering the foodstuffs, fat, carbohydrates, and protein, one would naturally turn to the proteins to make good a loss of proteins, and, indeed, that is necessary, but to no such degree as would be anticipated. There must be enough protein to meet the daily needs under ordinary circumstances—the 70 grams of which I spoke. There may be a slight storage of excess, which does not obtain in health, but if we give a frank excess, it must be destroyed and eliminated by the organism, and more than that in the process of its katabolism, by virtue of what is known technically as the "specific dynamic action," gives rise to a large amount of heat, which cannot be utilized for the purposes of the body, and extra burden is placed to dissipate the heat. The result is that about 140 calories of protein are required to secure 100 calories available for the purposes of the body.

Fat, on account of its well-known tendency to induce digestive disturbances and diarrhœa, must be used sparingly. According to the best known investigators in this field, the strongest sparers of body protein are the carbohydrates, and it is upon these that we place our reliance to solve the problem. It has been shown that the absorption of the fats, carbohydrates, and protein in typhoid fever, when severe diarrhœa is not present, is within 10 to 15 per cent. of normal, and Folin has shown that the absorption of the carbohydrates in this disease is practically normal.

In the feeding experiments carried out along this line of reasoning, among the typhoid fever cases in the wards of Bellevue Hospital the carbohydrate selected was milk sugar, because it ferments with difficulty and is less sweet to the taste than cane sugar and more soluble than the starches. The experiments showed that a nitrogen gain could be attained when the protein intake amounted to 75 to 85 grams, while at the same time the caloric content of the food was high, 3700 to 3900, or 70 to 73 calories per kilo; that is, enough protein was used to meet the daily needs and the loss of nitrogen was stayed by the high carbohydrate content of the food. When the same amount of protein was used with 32 calories per kilo, the loss was considerable. When only 16 grams of protein were used, but with 62 calories per kilo, the loss was greatest.

Now, in one of our most recent and authoritative systems of medicine, the diet advised is 4 to 6 ounces of milk every four hours, or 24 to 36 ounces a day; the whites of one or two eggs every four hours, making the whites of six to twelve eggs a day. Taking the larger amounts, and granting that the patients were fed night and day, we should have 730 calories from the milk, and, allowing 60 grams as the weight of an average egg, two-thirds of which is white, we should have in twelve eggs 480 grams. Of the white, 12.5 per cent., or one-eighth, is protein; the fat and carbohydrate almost negligible. That would give 60 grams of protein from the eggs, or 246 calories. These patients would get at the most 1450 calories, or about one-half their theoretical requirement. Of protein, they would get about 100 grams, a sufficiency, if backed by enough carbohydrate, This diet has been shown, in the Bellevue patients, to be accompanied by a large negative nitrogen balance. There may be theoretical considerations for such a low diet in typhoid fever, but I do not think that they have any scientific basis.

The more liberal feeding which has always been insisted on by individual clinicians, who, however, formed a small minority, is in the hospitals of New York today finding more advocates. The dietary at St. Luke's Hospital, contains on an average 63 ounces of milk to which 1 ounce of milk sugar is added, and three whole eggs a day. This diet contains 2585 calories, about 1000 less than Shaffer's and Coleman's and about 85 grams of protein.

The basis of the high caloric diet as used in the wards of Bellevue Hospital is milk, cream, eggs, milk sugar, bread, and butter. A quart of milk affords 650 calories. A quart of cream (20 per cent.) about 2000 calories; each egg 60 to 70 calories; milk sugar about 120 calories to the ounce; white bread, home-made, about 1225 to the pound—that is 100 calories to a thick slice of 1¼ ounces; butter about 3600 calories to the pound, or 100 calories in a pat a trifle under ½ ounce. With such materials various combinations may be made: 1½ quarts of milk will give 1000 calories, a pint of cream 1000, ½ pound of sugar about 1000 more, four eggs 250 more, thus making 3250 calories. If one wants a few calories more, 250 to 500 more can be gotten in 2 to 5 ounces of sugar added to lemonade..

A glass of milk that contains 7 ounces of milk, 1 ounce of cream, and 1 ounce of milk sugar, offers about 325 calories. Eight such glasses in twenty-four hours will give 2600 calories, as high as many care to go. The protein, as well as the calories, in this food must be remembered. The milk contains 35 grams to the quart, and the cream a trifle less, 25 grams; the eggs, 8 or 9 grams; the bread, about 9 per cent., or 45 grams to the pound loaf. In the more liberal dietary just suggested, about 100 grams are afforded; in the smaller, 70. Two eggs added to this would increase the protein to 85 grams.

Dr. Shattuck, of the Massachusetts General Hospital, has long advocated a more liberal dietary in typhoid fever, and can point to quite as good results as the advocates of a restricted or milk diet. I will not cite his dietary in full, but will mention some of its items, which show one how varied we can make our patient's food and relieve a monotony that threatens a loss of appetite and gastrointestinal disturbances. These are milk and the various milk products, some of which are better borne than others, such as buttermilk, koumys, matzoon, whey or milk with tea, coffee, or cocoa; or the milk can be diluted with lime water, Apollinaris, or Vichy; soups of beef, veal, chicken, tomato, potato, pea, bean, or squash, strained and thickened with powdered rice, arrowroot, flour, barley, or egg; gruels, ice-cream; eggs, soft boiled or raw, or eggnog; finely minced lean meat or scraped beef, soft crackers with milk or soups, soft puddings, soft toast without crusts, blanc mange, wine jelly, apple sauce, and macaroni.

Many of these articles have a low calorie content, and would not serve the purposes of our new teaching, but they show what is safe and what may be used to diversify the dietary.

Each patient must be carefully studied with reference to his dietary. We can make a mathematical problem of his food needs, but not of him. If he is highly toxic and stuporous, if he has gastrointestinal disturbances, we cannot expect him to ingest or digest the same quantity and quality of food that he would if his disease was of a milder type. We wish to avoid the older policy of frankly starving our patients, while we at the same time do not desire to stuff them like a Christmas goose, willy-nilly. I believe if the patient is moderately or severely ill when he comes under our observation, we should begin on milk for the first twenty-four hours, some two quarts; then a little milk sugar, a dram to a glass, and rapidly more as he shows that he handles it well; and at the same time or shortly after, a little cream—a half ounce to an ounce to a glass, watching this with especial care; eggs, gruels, or soups, bread or toast or crackers, ice cream, cup-custard, or other milk modifications. If the milk is not well borne, milk preparations, such as koumys, matzoon, buttermilk, or whey, may be used.

If the tongue is coated, if there are eructations, or if diarrhœa sets in, the cream should be stopped and the milk skimmed. Of the meat soups, one may say that they have little caloric value, but may improve the appetite. The scraped and minced meats may be allowed, if greatly desired, but they are not an economical form of food in fever, owing to their high specific dynamic action, and should not be given in the severe toxic cases, as it is believed, on fair grounds for such an assumption, that the liver in some of the cases is impaired and unable to metabolize the protein of the food brought to it in the normal manner.

At any rate, in such cases the urea nitrogen decreases while the "rest nitrogen" increases, and the giving of meat aggravates the condition and furnishes us in the convalescence of severe cases the so-called "febris carnis," as Ewing and Wolff believe.

I believe a patient should be given as much food as he will take and handle well. If he will take 4000 calories, he should have it; but with the earliest signs of gastrointestinal disturbance or disgust for food, one should diminish the food, and do so promptly. The patient's appetite is a valuable guide, and within the range of food mentioned, his likes and dislikes should be considered.

HYDROTHERAPY. If one had a brief to hold for hydrotherapy, he could not do better than to appeal to its application in typhoid fever. So thoroughly convinced is the American practitioner of its great value in this condition that arguments to maintain this thesis are only of historical value. The mortality of typhoid fever, vary as it may in different epidemics, hospitals, and localities, has, under the old expectant treatment, amounted to 15 per cent. the world over. Since the introduction of the cold water treatment, where large numbers of cases can be collected, as in great hospital services, the mortality has been cut in half, running about 7.5 per cent. with wonderful uniformity in the hospitals of our larger cities. Statistics have no value unless applied to large numbers. For example, in a certain hospital some 100 cases of typhoid were treated by the bath, with a mortality of 1 per cent. One might have attributed this success to some perfection of technique not prevailing elsewhere, but when the same clinician had collected 400 cases his published mortality showed 7.8 per cent., or that of the general experience.

The hydrotherapy of typhoid fever, as universally adopted in this country, is based on the Brand bath, or a modification of it, and the greater the modification, the less successful it seems to be. Two emphatic statements with reference to this bath should be made: (1) The essence of the bath lies in the application of cold water and friction, neither one nor the other alone, but both; (2) the purpose of the bath is to improve the condition of the poisoned centres and organs: the heart, lungs, kidneys, and centres in the brain and medulla; incidentally, and to a degree beneficially, to reduce temperature. The last is too often put first, which in this instance does not have biblical justification.

METHOD. The body should be immersed to the neck; the bath should be given preferably in a tub. In hospital practice, a portable tub on wheels is used. In private practice this is, as a rule, too cumbersome, and a tin bath tub may be used, elevated to nearly the level of the bed on wooden horses, blocks, or other contrivance. Placed alongside of the bed, the floor being protected by a rubber sheet, oilcloth, or carpet, it is filled three-quarters full of water, with buckets, or a hose attached to a tap, if one be conveniently near.

The patient's nightshirt is removed, his genitals covered with a napkin, bound about the body, or the whole body covered by a sheet, under which he is bathed, which latter method is a little more awkward. He is given a half ounce of whisky, or a cup of hot strong coffee (4 ounces), the face bathed with cold water, a folded bandage a couple of inches wide, bound around the forehead and tied below the occiput, to keep the water applied to the head from running into the eyes and streaming down the face, and he is then ready to be lifted into the bath. To do this, the best way is for one attendant to rest the patient's head on one arm while he raises the upper part of the body by lifting under the shoulders, while another attendant lifts the lower extremities, the patient being requested to stiffen himself out.

Another method, which has advantages if the patient is very stuporous, is to spread a hammock netting under him or a strip of canvas with straps attached, and lift him on this into the tub and by the same means out of it. The head should rest on a water-cushion ring or air-ring.

As soon as the patient is immersed in the bath, the equally important part of the procedure is begun—the friction, gently applied (not kneading) to all parts of the body except the abdomen. The back must not be forgotten. At intervals during the bath, cold water, at 50° F., should be poured over the head. While in the bath the bed should be prepared for his reception, by placing on it a double blanket, on the side he will occupy; a pillow is covered with a towel, the blanket is covered with a linen sheet, and hot-water bottles are placed at the foot.

The patient is then lifted onto the bed, the napkin is removed, and he is surrounded by the sheet, the edges and ends being tucked about the neck and under the arms. He may be allowed to lie in the sheet for five or ten minutes and then dried with soft towels, or more immediately if the temperature is low and he is shivering. The tub is best emptied by a siphon.

The temperature of the water Brand set at not more than 70° F., and not less than 65° F. The frequency he advised was every three hours, if the rectal temperature was above 102.5° F.; the length of the bath, fifteen minutes. These rules laid down by Brand have met with but slight modifications where satisfactory results are obtained. Slightly lesser temperature of water is used at times, a little higher temperature of the body taken as the indication of the bath, and the initial bath begun at a milder temperature.—At St. Luke's Hospital, in New York, the tub bath is given at 80° F., and in selected cases as low as 70° F. The bath is continued fifteen minutes. It is given every four hours, if the rectal temperature is 103° F. At the Presbyterian Hospital, in New York, the tub bath is given at 85° F. for ten to fifteen minutes, at four-hour intervals, if the body temperature is 102.5° F.

It is fully appreciated by the advocates of the Brand system that the reaction to a bath at 65° F. cannot be anticipated in markedly toxemic cases, so that a patient seen in the third week or latter part of the second, who is very toxic, should be subjected to a bath of higher temperature (75° F. or 80° F), and for a shorter time. Our hospitals rarely get patients in the first week, and the higher temperatures adopted are better suited to their class of cases.

If a tub bath cannot be obtained, a substitute for one can be constructed in the bed by running a clothesline around the bed, at a suitable height above its level, attaching a rubber sheet to it by clothes-pins, thus making a tub of the sheet. Other contrivances can be resorted to, to approximate a tub in the bed, as building around the sides and foot and head with rolled blankets, and the use of the rubber sheet as the receptacle for the water. When the patient is put in the water one expects a sudden shock, deep breath, and gasping. These are in themselves beneficial. The patient may shiver, the skin may be shrivelled, and the nails cyanotic, and yet not contraindicate the bath; but if the face is cyanotic, shivering marked, and chattering of the teeth occur, and the patient does not react well on being taken from the bath, then the next bath should be at a higher temperature and less long. Cyanosis of the face or threatened collapse should lead to immediate removal of the patient, warmth to the body externally and internally, and stimulants—hot coffee or hot whisky.

Many untoward symptoms in the bath are due to failure to appreciate the value of, and failure to apply properly the friction during the bath.

The benefit derived from the bath is very obvious and is expressed by improvement in the functions of various organs. No benefit can be expected from any procedure applied to the moribund, and the greatest success in the treatment of typhoid fever by this method is in the early application of it. Many of the severe symptoms seen in cases coming under observation or treatment late, are not observed at all in the cases bathed the first week. The most characteristic effect clinically of typhoid fever is the toxemia impinging on the brain, inducing restlessness, sleeplessness, delirium, stupor, and subsultus tendinum. The stimulating effect on these centres, receiving sensations pouring in from every point of the periphery and nourished by a better blood supply, is shown by an amelioration of every one of these symptoms, better sleep and more quiet, and a clearer mind more alive to its environments.

In typhoid fever the pulse is slow; when rapid, ominous; it is often dichrotic, bespeaking a low vasomotor tone. We stand in dread of heart failure, but the opinion prevails today that in acute infectious diseases the heart rarely fails, but that the vasomotor apparatus is the first to falter.

After the tub, the pulse is smaller and harder, losing its dichrotism; the pressure increases by 15 to 20 mm. Hg., and the rate falls. All this is very real, and may be attributed, in all probabilly, to the effect exerted on the vasomotor centres, though the tonic effect on the vascular walls of the periphery is undoubtedly a factor.

On the respiratory apparatus a beneficial effect is exerted by the fact that the contact with the cold water causes the patient to take deep breaths, which lessen the danger of passive congestion and hypostatic pneumonia that threaten in severe cases. More than that, the respiration of the tissues is enhanced, as increased oxidation can be demonstrated by measuring the oxygen intake and the CO_2 output.

The contact of the cold water and the friction improve the circulation in the skin and so improve its functions. The improved condition of the circulation increases the elimination of urine and the toxins of the disease. The temperature is lowered, but this is no longer considered the object of the treatment, and often in the height of the disease the temperature is not influenced, but striking improvement in the general condition is attained, in terms just given.

After all, it is the individual that is being treated, and this means that a precise procedure cannot be the optimum for every case. Higher temperature of the water and shorter baths are required for those who stand the shock of the typical bath poorly, for those toxic and advanced in the course of the disease, and for children.

Contraindications for the baths comprise hemorrhages and signs attributable to perforation or peritonitis, all of which conditions demand absolute rest until the proper procedure, surgical or otherwise, can be carried out. Cholecystitis, phlebitis, pleurisy, if accompanied by considerable pain, contraindicate the bath for a like reason. Cyanosis and syncope demand cessation of the bath in which they occur, but if the case is a severe one, the use of water may be continued in a milder form of application. Large bedsores, because of the difficulty of properly treating them, contraindicate the bath. Bronchitis, pneumonia, the milder grades of kidney involvement, and menstruation and pregnancy do not call for a change of procedure.

Beside the full bath of Brand, there are certain other methods of applying water in this disease. A slight modification of the Brand bath is the so-called graduated bath of Ziemssen. The details are the same as for the Brand bath, except that the water is warmed to 90° F., and then, after the patient is in the bath, is cooled down to 70° F. by adding cold water as the bath proceeds. The bath lasts half an hour with friction. This is a suitable procedure for those who stand the bath poorly, or think they do, and refuse the colder bath, or the very toxic cases of the later stages, or children.

When, for any reason, it is not feasible to use the tub, an approximation to the methods and results of a tub are attained by what is sometimes called a slush. The patient is stripped, a rubber sheet of ample proportions is put under him, the edges of which are elevated by pillows and blankets folded to the formation of a trough. Water is poured into this trough and the patient given a bath with friction, as in a tub, while cold compresses are kept at his head. The water, of course, becomes warm rapidly and is kept cold by adding bits of ice. The temperature cannot be so accurately regulated as in the tub. The head of the bed is elevated, the water drained off, the patient rubbed with a little alcohol, or alcohol and water, after drying and removing the rubber sheet, and then dusted with talcum. These slushes may be very effectual when properly given.

When the baths are refused, or for other reasons cannot be given, packs and sponges may be substituted; but, while these afford comfort and do some good, they fail in the general stimulating effect that comes from the friction of the body immersed in cold water.

CARE OF THE ALIMENTARY TRACT. In the routine treatment of typhoid fever there are no organs whose functions have to be so jealously guarded as those of the alimentary tract, not only because failure of digestion and absorption threaten a fatal issue in so long a disease, but because insufficient elimination and excretion heighten the toxemia, and because diarrhœa exhausts and hemorrhage and perforation await upon the advance of the local lesions. Constipation is almost constant in typhoid fever as we see it in New York. Diarrhœa, which one might gather from any of the text-books as characteristic, is rather the exception.

If seen early, a catharsis of castor oil, 1 ounce, or Epsom salt, 1 ounce, may be given. If seen late, all catharsis should be avoided. Enemas of tepid water, of soapsuds, or, in obstinate cases, soapsuds with an ounce of sweet oil, or castor oil, should be given every other day. It is the lower bowel one wishes to empty, not the upper, and this can be done effectually with the enema. The upper bowel, the site of the lesion, like any other inflamed part, should be given as much rest as is compatible with its physiological functioning.

The lower bowel is physiologically differentiated; the lower part forming the reservoir for undigested food, and, what is more important, the excreted matter, the nitrogenous content of which forms an almost constant portion of the total nitrogen output; it is, too, the site of active bacterial action. and is an absorbing surface. We wish to avoid absorption of toxic material of bacterial action, which may add its burden to the already overloaded blood. Nothing is more surprising than the large stools obtained from patients on a milk diet, and still more, the considerable movements obtained when patients are taking little or no food. The patient's plea to avoid the enema that he has taken nothing, therefore, can have nothing to evacuate, must be met by explanation of the physiological fact and demonstration of its accuracy.

Tympanites, to some degree, is almost constant, but when marked is usually the expression of the severity of the intoxication. This paretic condition of the bowel, which allows the collection of large quantities of gas, is rife with danger, as it increases the chances of hemorrhage and perforation, and interferes with respiration and cardiac action; pain may be an accompaniment. The free use of water, the attention to periodical evacuation of the bowel, and the general tonic effect of the baths, lessen the severity of this complication. When, in spite of such precautions, it does obtain, the following measures may be carried out:

1. Introduce for a distance of 12 to 15 inches into the bowel a soft, pliable rubber catheter, taking great care not to use force. The larger bowel is, as a rule, more implicated than the smaller. This will at times permit the escape of considerable amounts of gas. It should be left in ten to twenty minutes, or even a half hour, and may be repeated every two to four hours, as indicated. Turning the patient while the tube is in place may facilitate the escape of gas.

2. The use of stupes. Two or three thicknesses of flannel are wrung out of hot water, as dry as possible, and applied every three or four hours. The technique is as follows: A flannel roller is put under the patient, the abdominal wall smeared with vaseline, the stupes applied, the edges being turned under to prevent dripping; oil silk applied, and the roller brought up over the stupes in the manner of a binder. This should be changed every two or three minutes for ten or fifteen minutes, or every ten or fifteen minutes, for several hours.

3. Turpentine. There are three ways of administering turpentine to relieve this condition: First, in the stupes, by adding a dram of turpentine to the hot water into which the flannels are to be dipped; by sprinkling the stupes with turpentine; or by very lightly passing a bit of absorbent cotton wet with turpentine over the abdomen before applying the stupes. Care must be constantly exercised not to irritate or burn the skin. Careless application of the turpentine will certainly entail such trouble. The second method is by giving turpentine enemas. One-half ounce to an ounce of turpentine is to be used in one pint of soapsuds enema. The method is as follows: Take a little hot water and a piece of Castile soap; make a thick soapsuds; add the turpentine slowly, constantly stirring. This makes an emulsion. Add the pint of water, and the emulsion remains stable. Oil enemas are made in the same way. The third method is by the mouth; 10 to 20 drops are used every four hours. It is sometimes dropped on loaf sugar, but the turpentine makes the sugar tough and not easily soluble. It is better given in capsules, 10 minims each, or in emulsion, to

which a little oil of cinnamon may be added as a flavor, while at the same time it adds to the effect of the turpentine. Thus:

℞—Olei terebinthinæ rectificati	10
Olei cinnamomi	q. s. (or 3)
Acaciæ	q. s.
Aq. destillatæ	q. s.
M. et fiat emulsum	60

Sig.—One or two teaspoonfuls.

Sometimes a large flat ice-bag or the ice-coil, brings relief, and if all these measures fail, a hypodermic injection of eserine salicylate or sulphate ($\frac{1}{60}$ grain) may be tried. The diet should be materially decreased, milk stopped, and albumin water administered, and water given freely, if the condition is severe.

Diarrhœa, fortunately, is not a common complication in typhoid as we see it here. Two or three loose movements a day do not call for interference, except in the matter of regulation of food. The food and neglect of the bowel may be the inciting causes. If the patient is on a milk diet, the fat is more likely to be responsible for the diarrhœa than any other constituent of the food, and should be removed. Scalding the milk may help, If the diarrhœa is severe, the food should be cut down. Of the astringents, bismuth is the best, and should be given in sufficient doses (30 grains) every two or three hours. This must not be kept up too long, or if administered over a long period, it must be remembered that the bismuth may be retained in the bowel in such quantities as to produce irritation by sheer weight, while the diarrhœa still continues; hence, the necessity for irrigations.

Prolonged saline irrigations, by improving diuresis, lessening toxemia, and keeping the bowel clear, may be of distinct advantage. It is tempting to use opium, but it cannot be too emphatically insisted upon that by so doing, pain, the earliest and most important symptom of perforation, may be lacking—to the patient's undoing. It should not be used unless exhaustion from diarrhœa and increasing danger of hemorrhage and perforation from peristaltic unrest seem to demand it. Then one may give a few large doses, rather than long-continued small ones; for example, a pill of opium ($\frac{1}{2}$ grain) every two hours for three or four doses, or some such marked astringent mixture as one of our well-known clinicians has advised:

℞—Pulv. opii	0.25	(gr. iii¾)
Pulv. camphoræ	1.00	(gr. xv)
Plumbi acetatis	3.00	(gr. xlv)
Bismuth. subnitrat.	30.00	(oz. j)

M. et div. in chart. no. xv.
Sig.—One every four hours.

Gastric distress and vomiting are not common. If vomiting does occur, the milk should be skimmed; or, if severe, stopped. Cracked ice, in small pieces, sucked, may be of avail. Then try a mild mustard paste to the epigastrium, one part in four of flour. If these do not succeed, try a bland powder of cerium oxalate (3 grains), sodium bicarbonate (5 grains), and bismuth subnitrate (10 grains), every two hours. If very severe, cocaine hydrochloride ($\frac{1}{8}$ grain) in tablet form, or one teaspoonful of 0.1 per cent. solution every two or three hours. Finally, stomach washing may succeed when other measures have failed.

Few things are more trying than meeting the danger arising from hemorrhage and perforation. Few occurrences demand more judgment and common sense than treating the hemorrhage of typhoid. To judge by the advice given by some authors, the appearance of hemorrhage is to be treated like an invading foe, to be met with every weapon at our command, from stiletto to bludgeon; while more timid counsellors urge letting it severely alone, lest by interference we come off worse than before. In the first place, in the early stages, a little blood may appear in the stools, resulting from an oozing of the hyperemic patches, and such small amounts at such a period need no treatment. In the latter part of the second week, and during the third, we are anticipating the hemorrhages of real significance from the ulcers and know that they do occur in about 7 per cent. of the cases. If the hemorrhage is mild, that is, small in amount, or well borne by the patient, we may have no premonition of it until the stool shows the red blood of the recent bleeding, or the tarry stool of one occurring some hours before.

In these cases, the present bleeding is of less importance than that which may occur later, so that our treatment is largely prophylactic. We cut down the food, we enjoin absolute muscular rest on the part of the patient, and turn him gently when required.

We may apply a light flat ice-bag or coil to the abdomen. We may give calcium lactate in doses of 10 grains three times a day, and in the light of our recent knowledge of the effect of horse serum on coagulation, we may give a dose of 10 to 20 c.c. of it; or, failing that, diphtheria antitoxin in similar amounts. To get the best results from the serum, it should be as fresh as possible. The old serum loses much of its potency in this respect. If fresh horse serum is not available, fresh rabbit's serum may be used.

Antitoxin, because it is likely to be old, is less valuable, and when a concentrated antitoxin, made from the globulins, of no use at all. The same precaution must be used in administering the serum for this purpose as when giving antidiphtheritic or antitetanus serum, to avoid the results of anaphylaxis. To prevent this, a dose of 10 minims is given, which will be enough to produce sufficient evidences of anaphylaxis if it exists, but not a fatal result. If no manifestation appear in a half hour, the full dose may be given with more assurance. An initial dose of serum after a matter of ten days is likely to establish an anaphylaxis, and this precaution is doubly necessary, when a second dose is given after such an interval. Immunity against anaphylaxis may be established by giving doses of serum—full doses—every day, or second day.

If the 10 minims cause anaphylactic manifestations, wait a couple of hours and give another 10 minims, and a third and a fourth at the same intervals. If no further symptoms appear, the large dose may be given.

If, however, the hemorrhage is severe, as shown by the large quantity of blood passed by the bowel, and even more if general symptoms of hemorrhage prevail, with or without the passage of blood—that is, sudden fall of temperature, pallor, cold sweat, cold extremities, rapid thready pulse, restlessness, and air-hunger, more decided measures must be taken. There is one drug that is of greater value than any other, namely, morphine.

It is to be given in doses of ¼ grain under the skin. Morphine is not a styptic, nor has it any effect on the caliber of the vessels or coagulation time, but what it does do is to afford the maximum amount of rest, both to the bleeding bowel and to the anxious brain, and to the restless and uneasy body, whose useless movements keep up the blood pressure. This gives the bleeding vessel a chance to do what it is trying to do—form a clot. It is pointed out that perforation occurs in these hemorrhages—one-fifth of the perforations; and that the use of opium blinds the symptoms, and no doubt it does, but, while anticipating such a complication, we cannot sit by and see our patient die from the hemorrhage.

There are many cases that come between these two extremes, and success in these cases is the fruit of experience and judgment. One can only say, when a patient is to be under constant observation for some hours to come, as he ought, hold off the opium as long as possible. If circumstances will not permit remaining by the patient, one should not spare the opium.

The bowels should not be moved for some three days after a hemorrhage, and then with caution. One should get back on the diet slowly and combat meteorism.

When the hemorrhage causes exsanguination, it must be treated like any other hemorrhage—elevation of the foot of the bed, heat to the extremities, saline infusions of 0.9 per cent. sodium chloride solutions, or transfusions.

Even more dangerous than hemorrhage is perforation. It occurs in 2 to 3 per cent. of the cases and causes some 12 per cent. of deaths in typhoid fever. It seems to occur as frequently in cases treated with the bath, but because of the lower mortality of the disease so treated, the percentage of death from perforation rises. If one in eight or more of the deaths in typhoid fever are due to perforation, it becomes a moral obligation to know the signs well. One will recall the sudden onset, with acute abdominal pain, like a bolt out of the blue; its paroxysmal character, the rapid rise in the leukocytosis, the two most important early symptoms, I think; then the change in respiration, rapid pulse, distressed expression, local muscle spasm, rigidity, tympanites, with, perhaps, obliteration of the liver dulness.

Every attack of abdominal pain should mean perforation until continuous observation convinces otherwise, for thus its occurrence will not be overlooked. When it occurs, the surgeon should be summoned, an operation performed, and the perforation closed. If satisfied that pain has no such significance, then the ice-bag or stupes, or a light application of the cautery or small doses of bromides or codeine may be used; or, if more severe, small doses of morphine.

The cerebral disturbances are characteristic of this disease. In the early stages there may be much headache. This is best treated by the ice-cap. Sleeplessness is another common occurrence, and, as has been explained in considering rest, a symptom to be combated. Hydrotherapy properly applied mitigates this to a great degree. Small doses of bromides may be used, or trional in 15 to 20 grain doses, or chloralamid in 20 to 30 grain doses; but if it is marked and prolonged, morphine is the best drug to use. Delirium and stupor are best met by the baths. In all decided cerebral symptoms, help may be obtained from the tepid bath, with cold water poured over the head; from the ice-bag, from morphine, and, finally, when the delirium is great or the stupor deep, from lumbar puncture, an easy and innocent procedure. Draw off 20 c.c. at least, and more will do no harm, though headache may be aggravated by draining the cord. No delirious patient should be left alone for a moment. Restraint by sheets or other devices are sometimes needed.

CIRCULATION. When the characteristically slow pulse of typhoid fever becomes rapid, going above 100 to 110 to 120, our concern is elicited. If the heart is weakening, we shall get a poorer quality of first sound, perhaps evidences of dilatation and mitral insufficiency, poorer quality of pulse, and a fall in blood pressure. A sufficiency of diet and the hydrotherapy do much to prevent this disaster. If, however, the condition supervenes, stimulants must be given: digitalis in the form of infusion (2 drams four times a day), watching carefully for evidences of its physiological action, which, when obtained, indicate its cessation for a period, as the drug is slowly eliminated. If it cannot be taken by the mouth, on account of gastric disturbance, or when the demand is more urgent, diaglen may be used hypodermically in doses of 10 minims every four hours, or strophanthin ($\frac{1}{60}$ grain) intravenously or intramuscularly; strychnine, too, may be tried, in doses of $\frac{1}{30}$ or $\frac{1}{40}$ grain, every four hours, by the mouth or under the skin, according to circumstances. Caffeine, sodium salicylate (3 grains) every four hours, given in the same way, is even more reliable.

In threatened circulatory collapse, the more rapidly acting stimulants, as camphor (3 to 5 grains) in 20 per cent. solution, in sterilized oil, or adrenalin (15 to 20 minims) may be used intravenously.

Alcohol requires a special discussion. Briefly I do not consider it a stimulant in the true sense of the word. Viewed from a chemical, pharmacological, or therapeutic standpoint, I think the weight of evidence is against its stimulating properties. It is hard to conceive that this member of the marsh-gas series, all of whose other members—alkanes, alcohols, aldehydes, ketones—are depressant, should furnish this one exception, ethyl alcohol; or two, ethyl alcohol and ethyl ether, which are stimulating. The results of animal experimentation are decided for the depressant effect of alcohol, while I am convinced that the trend of therapeutic opinion is increasingly in the same direction.

That the stimulating effect of alcohol on the mucous membrane of the stomach may reflexly stimulate the circulation is left sub judice; that alcohol has a food value is scarcely denied, and no doubt has contributed to the patient's strength when the food is insufficient; but neither of these effects are justification for the use of alcohol as it has been administered in typhoid fever. In the so-called typhoid state, characterized by cerebral excitation, sleeplessness, rapid pulse, dry skin, coated tongue, and subsultus tendinum, the picture, to my mind, is one of hyperexcitation of the nervous centres by the toxins of the disease. I believe that the improvement seen in this condition by the judicious use of alcohol is due to the sedative effect of the drug on these centres and not to stimulation. This conception confines the use of alcohol to this stage or state of the infection and decries its use where any of the functions are failing from exhaustion. Personally, I would rather not use it at all in typhoid fever, except in the condition just described, and then tentatively: not more than a half ounce of whisky or brandy every four hours.

The urinary tract is not to be neglected. In the early days of the disease especially, the patient's bladder may be overdistended. Close observation should be directed to this organ, and with the first evidences of retention, efforts should be made, by hot applications over the hypogastrium or by hot enemas, to provoke urination. If such measures fail, catheterization must be done, but should be done by the physician, to avoid by his care the infection that so frequently follows this procedure. Overdistention means stagnation, weakening of motility, and lowered resistance to infection by pathogenic organisms and invites a bacilluria. Bacilluria is a very real menace, more to the community than to the patient himself, as true cystitis or pyelitis of typhoid origin is rare. It occurs in nearly 25 per cent. of the cases, often in such numbers as to render the urine turbid. It is most common as the temperature begins to approach the normal and runs into convalescence. It probably arises by infection through the kidney, the bacilli finding a good culture medium in the urine, especially when the urine is of a low acidity and there is any stagnation, such as might result from neglect of overdistention. The bacilli tend to disappear spontaneously, probably at such a time as the urine becomes a less favorable medium and the improved tone of the bladder facilitates mechanical removal. However, the condition may remain for weeks, months and, in a few cases, for years. It has been shown that a high degree of acidity, and especially an increasing content of organic acid, inhibit their growth. The effort should be made to eliminate them, as a prophylactic measure, for absence of local symptoms make the convalescent an innocent menace to the community. Urotropin has been shown to have an astonishing effect on their growth, sometimes clearing up a turbid urine in a day or two. It may be given in doses of 5 to 15 grains for two or three days, a week, or continuously, beginning late in the disease and continuing into convalescence.

A good rule would be, beginning when the temperature approaches normal and continuing for a month after, to give 5 to 10 grains of urotropin three times a day for three consecutive days each week. When this does not clear up the bacilli, or a true cystitis prevails, bladder irrigations of silver nitrate, 1 to 5000 daily, or a saturated solution of boric acid, should be instituted.[1]

Perhaps the most promising field of specific therapy at this time is the vaccine treatment, the hypodermic use of the dead bodies of the typhoid bacilli, derived from the patient's own blood (autogenous) or from others (heterogenous). The results are not yet sufficiently definite or the details of procedure accurately enough determined to find a place in an article of this kind.

Drugs aimed at the disease itself, intestinal antiseptics, etc., have been left out of consideration, because it is believed that, on the one hand, no good results are to be obtained, while, on the other, harm may be done by the drugs themselves and by the neglect of the more useful measures advised, entailed by reliance on the drugs.

CONVALESCENCE. Convalencence is one of the most trying periods of the disease to deal with, both from the standpoint of the patient and the physician. On the part of the one is the impatience to relieve the gnawing appetite and be released from a confinement which has already dragged itself out to such lengths. On the part of the other is the haunting dread lest the intestinal lesions be not yet healed and that too early activity and too early feeding will induce perforation and establish a relapse.

Less difficulty will be met with in the matter of the dietary if sufficient food has been administered according to my advice, for hunger will be less imperative, and a considerable variety has already been allowed. During convalescence it has been demonstrated that a nitrogen storage takes place which does not obtain in health. We may then add slightly to our protein intake by allowing scraped beef, loin chops, and chicken. The kinds of food that we do avoid, however, are those with a large indigestible residue.

---

[1] Connell, AMER. JOUR. MED. SCI., May, 1909.

We can feed pretty much as follows, if our patient has been confined largely to a milk diet or has been highly toxic: After the temperature has been normal for four or five days, allow milk toast, then poached egg, then a chop or piece of chicken, then spinach, asparagus tops, purees of peas or tender string beans, the articles of the preceding days being also allowed. Watch the effect of each article carefully.

During the convalescence, excitement must be avoided, business cares excluded, too frequent visits from well-meaning friends interdicted, and other sources of fatigue prevented. After the patient has been restored to a considerable degree of strength, he should still be forbidden to return to work too early. A long vacation, if possible, of three to six months, should be taken, and it is often of great benefit if taken in other surroundings. After the temperature has been normal for a week or ten days, the patient may be propped up in bed, and in three or four days more be allowed to sit up in the chair, a little longer each day, and if all goes well, in a week be allowed to try his feet.

Every case must be approached on its merits, and if the pulse shows by its rate and poor quality that the demands on it are too great, the rest must be prolonged and the getting up be more gradual. To get the patient out in the sun and air is certain to facilitate the progress of his convalescence. During this time his bowels must be attended to with the same care as during his illness in bed, at first aiding with enemas, and later with a mild cathartic like cascara. If there is a great deal of anemia, Blaud's pills may be given, 5 grains, three times daily. If the weakness is prolonged, strychnine, $\frac{1}{40}$ grain, three times daily, may be administered.

A slight rise in temperature, day after day, is one of the most nagging features of a convalescence. This may be due to absorption from a neglected bowel, or it may be due to insufficient food, and eminent clinicians long ago pointed out that these patients' temperatures returned to normal when solid food was given them. Others still, who have been highly toxic, whose urea-forming function has been impaired, may become febrile if meat is given too early —the so-called "febris carnis." Others mend rapidly when kept in the air and light.

PROPHYLAXIS. Typhoid fever is a preventable disease. Its prevention awaits upon the overcoming of an inertia. McCrae divides the subject under three heads: (1) General measures, which are for the protection of the community; (2) special measures in connection with the patient; and (3) preventive inoculation. The knowledge that the disease is conveyed through the water, milk, food, especially oysters and green vegetables eaten raw, demand the supervision of the State and the community, through Boards of Health and Sanitary Commissions, supervision of the water supply, with reference to policing the water sheds, filtration plants, and all the details dictated by sanitary science. It demands supervision of the milk supply, inspection of the dairies, health of the workers, and a consideration of sewage disposal with reference to oyster beds. It demands notification by physicians to Boards of Health of all cases of typhoid or suspected typhoid fever occurring in a community, and it demands education of the public through schools, lectures, and exhibitions of the part these various factors play in the prevention or spread of the disease.

In connection with the patient arises the question of isolation. Here in New York, as pretty much everywhere else in this country, typhoid fever is treated in the same wards as the general run of cases, and we assume from our familiarity with this condition of affairs that there is no danger in the practice. It is a little startling, then, to be told that the statistics of one of the best conducted hospitals in this country show that from 1.5 per cent. to 2 per cent. of the cases of typhoid fever treated in this hospital are of hospital origin. I have seen this thing occur in my own wards, and so has every attending physician, but still our patients are not isolated. As regards the disinfection of stools, urine, sputum, vomitus, and care of clothing and utensils, all this has been touched upon. If we were faithful in carrying out these measures in every case of typhoid fever, there soon would be no more cases, for, after all, the patient is the true source of typhoid fever.

The attendants about a patient are a source of infections for others unless conscientious in their cleanliness. A great source of danger that might be overlooked are the flies, carrying the infectious material direct on their legs and bodies from the excreta to food and water. Screens are an obvious help in their exclusion.

One great menace to the community, the handling of which is no easy problem, is the chronic bacillus carrier. Some patients harbor for months and years virulent bacilli in the urine, and more commonly in the feces, from constant passage into the bowel of bacilli from an infected gall-bladder. Bacilluria and its treatment have been touched upon. Some day, perhaps, Boards of Health will demand to know whether the stools of a typhoid fever patient are free from bacilli before he is allowed the freedom of the community, as they now demand to know whether the Klebs-Lœffler organism is absent from the secretions of diphtheria patients before release from quarantine.

As has been said, serotherapy has not yielded tangible results as yet, but much that is promising has come from the preventive inoculation or vaccination originated and applied to the troops of the British army by Sir A. E. Wright.

The procedure consists in the culture in bouillon of the organism for four weeks, then killing at 60° F. Different strains are mixed together, standardized, and two injections made at intervals of two weeks of amounts of 0.5 to 1.5 c.c., the first containing about

1,000,000,000 bacilli, the second 2,000,000,000. This is usually injected into the flank, from which may result some redness and pain and involvement of lymph glands draining that territory. There may be some constitutional reaction, fever, malaise, nausea and vomiting, but of no significance. Statistics seem to show that among some 20,000 inoculated soldiers the incidence of disease and the mortality was about one-half of that of the 150,000 uninoculated. This looks to be a tremendous advance in the struggle against the disease.

CHOLERA FROM A MODERN STANDPOINT.

By Alvah H. Doty, M.D.,
HEALTH OFFICER OF THE PORT OF NEW YORK.

The recent outbreak of cholera in Europe has furnished reasonable and scientific evidence that the theories we have heretofore entertained regarding the period of incubation of this disease and the character in which it appears have been more or less erroneous. Reliable proof has been presented to show that, while it is probable that typical cases of cholera present themselves within five days after infection, there are mild or irregular cases, the incubation of which may cover a period of weeks, or, as in the case of cholera "carriers," symptoms of the disease may never occur, or when they do, it is usually after the administration of some form of intestinal stimulant sufficiently powerful to arouse the dormant organisms to activity, which is then followed by a sudden appearance of the symptoms of the disease. Even when this does not occur, it is reasonable to believe that carriers who remain apparently well may act as a medium of infection. If I remember correctly, a case of a cholera carrier has already been referred to by Professor Calmette. In this instance a young man, presumably infected in Hamburg during the outbreak of cholera in that city in 1892, traveled for two or three weeks on the Continent, and then, after a night's debauch, suddenly developed the disease.

A similar case has recently occurred in my service at the New York Quarantine Station, the facts of which are as follows: A vessel arrived at Quarantine from Naples after a voyage of fourteen days; the certificate of the ship's surgeon stated there had been no deaths on board, no cases of infectious disease or suspicious cases, nor any case of intestinal trouble during the voyage. None were found sick on the arrival of the vessel. As an extreme measure of precaution at the New York Quarantine Station, during the emerg-